8 Comparative Analysis of Removal Action Alternatives

A comparative analysis of the Removal Action Alternatives with respect to the effectiveness, implementability, and cost criteria is presented in Table 8-1 and described below. All of the removal action alternatives are expected to be technically implementable. They all involve proven technologies, and equipment and services are expected to be available.

Alternative 1 — Stabilization and Closure in Place

The Stabilization and Closure in Place alternative will be effective in stabilizing the pile to prevent potential collapse and migration of sediments into West Sharrard Gulch. Furthermore, the cap will reduce exposure of contaminants via air pathways and ingestion and serve as a barrier between the waste shale and potential receptors. However, since the pile will remain in place, the potential for migration of contaminants into ground water is not completely mitigated. In addition, the possibility of erosion due to the steep slope of the regraded area also poses a risk for potential migration of sediments into surface water. Finally, this alternative would require extensive long-term monitoring to adequately monitor the effectiveness of the alternative and to comply with Colorado Solid Waste regulations.

Alternative 2 — Placement in an On-Site Repository

The excavation and placement of the waste shale into an on-site repository carries many of the same benefits as those presented in Alternative 3. As the pile would actually be excavated to another site, the risk of collapse of the pile into West Sharrard Creek is no longer applicable. Furthermore, the placement of the material into a location removed from the West Sharrard Gulch would lessen the risk of possible erosion and sediment transport into surface water;

as well as reduce the potential for leaching of metals-contamination into ground water. A principal critical issue in implementing this alternative is locating a suitable site. The site should be accessible, be uncontaminated from previous APF operations, and have sufficient area to accommodate the waste shale materials. The constructed on-site repository will have to comply with Colorado Solid Waste regulations including long-term post-closure monitoring.

Alternative 3 — Placement in an Off-Site Commercial Landfill Facility

The excavation and placement of the waste shale materials in an off-site commercial landfill facility is an effective and implementable removal action. The principal difference between this alternative and Alternatives 2 and 3 is cost. Landfill and/or hauling fees are significantly higher than stabilizing in place or building an on-site repository for the waste shale. Furthermore, the long-term liability of placing the material in a commercial facility remains to be determined.

Table 8-1: Comparative Alternative Analysis

Evaluation Criteria	Alternative 1: Stabilization and Closure in Place	Alternative 2: Placement in an On-Site Repository		Alternative 3: Placement in an Off-Site Commercial Landfill Facility
EFFECTIVENESS	Overall – Partially effective	Overall - Effective		Overall – Effective
Protective of public health and community	Yes	Yes		Yes
Protective of workers during implementation	Yes – Engineering controls to be employed	Yes – Engineering controls to be employed		Yes – Engineering controls to be employed
Protective of the environment	Yes	Yes		Yes
Complies with ARARs	Yes	Yes		Yes
Ability to achieve removal action objectives	Yes with slightly larger possibility of ground water and surface water contamination because of location	Yes		Yes
Level of treatment/containment expected	Contaminated material is expected to be well contained but erosion is possible	High level of containment		High level of containment
Degree to which treatment will be irreversible	No treatment specified	No treatment specified		No treatment specified
Satisfies the CERCLA preference for treatment	No	No		No
No residual effect concerns	Erosion of cover near stream may result in deposition in stream and ground water contamination	Yes		Yes
Will maintain control until long-term solution is implemented.	Action is proposed long-term solution	Action is proposed long-term solution		Action is proposed long-term solution
IMPLEMENTABILITY	Overall – Implementable	Overall – Implementable		Overall – Implementable
Technical feasibility	Feasible using standard methods and procedures	Feasible using standard methods and procedures		Feasible using standard methods and procedures
Construction and operational considerations	High level of operational requirements – partial excavation, compaction, grading, closure	High level of operational requirements – excavation, hauling, landfill construction and closure		Moderate level of operational requirements – excavation and hauling
Demonstrated performance/useful life	Some uncertainty given steepness of slope and proximity to stream	Adequate life expectancy		Adequate life expectancy
Adaptable to environmental conditions	Yes	Yes		Yes
Can be implemented in one year	Yes – with ground water monitoring to continue beyond one year	Yes – with ground water monitoring to continue beyond one year		Yes – with adequate capacity at landfill
Availability	Yes	Yes		Yes
Equipment	Yes	Yes		Yes
Personnel and services	Yes	Yes		Yes
Outside laboratory testing capacity	Yes	Yes		Yes
Off site treatment and disposal capacity	No offsite treatment or disposal	No offsite treatment or disposal		Yes – probable
Post removal site control and monitoring	Required	Required		None
Permits required	Permits not required for BLM CERCLA actions	Permits not required for BLM CERCLA actions		Permits not required for BLM CERCLA actions
Easements or rights-of-way required	No	No		No
Impact on adjoining property	Impacts to adjoining properties may occur through ground water and surface water contamination	No impacts to adjoining properties		Use of existing roads and landfill space on adjoining property
Ability to impose institutional controls	Yes	Yes		Yes at site but not at commercial landfill facility
Community acceptance	Unknown, but can be determined through public comment	Unknown, but can be determined through public comment		Unknown, but can be determined through public comment
		Former Plant Site Location	Former Water Evaporation Pond Location	
COST	Overall – $4,280,000	Overall – $4,215,000	Overall - $4,977,000	Overall – $8,763,000
Direct capital cost (i.e. construction, materials, transportation)	$3,262,000	$3,145,000	$3,886,000	$8,413,000
Indirect capital cost (i.e. legal, engineering, administrative)	$701,000	$700,000	$721,000	$244,000
Post removal action site control, maintenance, and monitoring cost	$317,000	$370,000	$370,000	$106,000

9 Recommended Removal Action Alternative

9.1 Description of Evaluation Process used to Develop Recommended Action

As directed by EPA guidance, the three Removal Action Alternatives presented in this EE/CA have been evaluated against the following three general criteria: effectiveness, implementability, and cost. The specific components of each criterion are defined as follows:

Effectiveness Evaluation

- Overall protectiveness of human health and environment
- Ability to achieved RAOs/ARARs
- Short- /long-term effectiveness

Implementability Evaluation

- Technical feasibility
- Administrative feasibility
- Availability of materials and sources
- Community applicability

Cost Analyses

- Capital cost
- Post removal control cost
- Present worth cost
- Maintenance and monitoring costs

9.2 Recommended Removal Action

Based on the evaluation criteria, the recommended removal action is the placement of the waste shale materials in an on-site repository. This alternative represents a high level of overall protectiveness of human health and the environment and achievement of the RAOs and ARARs. It is technically and administratively feasible and is potentially the lowest cost alternative considered. The off-site commercial landfill alternative would be as protective of human health and the environment; is technically and administratively feasible; and, would eliminate the need for BLM to design, construct, and maintain a landfill at the Anvil Points property. The difference in cost is significant, with the principal cost elements being landfill and transportation fees. However, if landfill fees at the West Garfield Landfill can be negotiated to a price acceptable to the BLM, this alternative may be more desirable in the long term.

9.3 NEPA Adequacy Analysis

The APF project follows CEQ guidance that potential impacts to the human environment be discussed in proportion to their significance. For the purposes of this document, this includes assessing potential impacts of proposed removal action alternatives within the larger context of the Roan Plateau Draft Resource Management Plan Amendment/ Environmental Impact Statement (DRAFT RMPA/EIS). This document—currently in the public comment period—updates the Glenwood Springs Resource Area Record of Decision and Resource Management Plan (BLM 1988a), which did not specifically address NOSRs 1 and 3, which were at the time not under BLM Management. The most current active land use plan for the APF area is the Glenwood Springs Resource Area Oil and Gas Leasing and Development Final Supplemental Environmental Impact Statement (FSEIS) (BLM 1999). However, this plan is limited in its applicability to the APF by solely addressing oil and gas leasing. The DRAFT RMPA/EIS prescribes how the BLM will manage the various resources present within the Roan Plateau Planning Area, which includes NOSRs 1 and 3.

Critical elements considered for analyzing the impacts of the proposed remedial action alternatives to resources covered by NEPA are listed in Table 9-1, following guidance in the BLM NEPA Handbook (BLM 2001) and DOI Instruction Memorandum (IM) No. ID-2003-075 (DOI 2003).

It is assumed that elements addressed by specific ARAR designations and/or resource clearances will experience no significant impacts as a result of implementation of the recommended action.

Table 9-1: Elements Identified for Analysis of Impacts of Recommended Removal Action Alternative		
Element	**Relevance and Disposition**	**NEPA Impact Analysis Applied**
Critical Elements		
Air Quality	Applicable. Addressed as an ARAR	
Areas of Critical Environmental Concern (ACECs)	No designated ACECs in shale pile area or general APF site	
Cultural Resources	Applicable. Addressed as an ARAR and a clearance. No impacts to element.	
Environmental justice*	No minority or low income communities on the APF site.	
Farm Lands (prime or unique)	None present in shale pile area or general APF site.	
Floodplains	Applicable in shale pile area.	X
Invasive, non-native species*	Applicable.	X
Migratory birds*	Not present in shale pile area.	
Native American Religious Concerns	Applicable. Addressed as an ARAR and a clearance. No impacts to element.	
Threatened or Endangered Species	Applicable. Addressed as an ARAR and a clearance. No impacts to element.	
Wastes, Hazardous or Solid	Applicable. Addressed as an ARAR and by proposed action.	
Water Quality - Drinking/Ground	Applicable. Addressed as an ARAR and by proposed action.	
Wetlands/Riparian Zones	Not present in shale pile area.	
Wild and Scenic Rivers	Not applicable to APF.	
Wilderness	No designated Wilderness Study Areas in general APF area.	
Non-critical Elements Required for Eas in Colorado		
Adaptive management	Applicable.	X
Collaborative planning	Applicable. Addressed through CIP.	
Socio-economics	Applicable.	X
Vegetation	Applicable.	X
Aquatic wildlife	Applicable.	X
Terrestrial wildlife	Applicable.	X
Non-critical Elements		
Access	Applicable, no impacts.	
Fire management	Applicable.	X
Forest management	Not present.	
Geology and fluid/minerals	Applicable.	X
Hydrology/water rights	Applicable.	X
Law enforcement	Applicable, no impacts.	

*Added to NEPA critical elements by DOI IM (DOI 2003).

9.3.1 Critical NEPA Elements

Floodplains

Mitigation activities during excavation of the shale pile, especially implementation of BMPs to limit movement of spent shale, fines, or surface runoff, will prevent any direct adverse impacts to the immediate West Sharrard Creek floodplain. No part of the recommended action will directly or indirectly support floodplain development, per direction in the BLM NEPA Handbook to follow Executive Order 11988. Impacts to floodplain resources, including riparian/wetlands, wildlife, and fisheries are discussed below. Minimal, if any, negative impacts are expected to the West Sharrard Creek floodplain. Positive impacts to floodplain resources such as riparian/wetlands, wildlife and fisheries located downstream from the shale pile are expected as remediation activities result in greatly reduced contaminant entrance into the floodplain area.

Invasive, Non-native Species

In the vicinity of the APF, invasive, non-native species are limited to plants. As described in Section 2.6.1, a number of invasive plant species occur throughout the APF, including some within the immediate vicinity of the shale pile. Cheatgrass is by far the most common, often being the dominant plant species in some areas adjacent to the shale pile.

BMPs to limit the spread and promulgation of weeds will be implemented throughout the pile excavation and haulage. On-going weed management practices and BMPs will be used to limit the establishment of weeds and encourage the establishment of desirable vegetation cover on the final repository. Minimal, if any, negative environmental impacts are expected from invasive, non-native plant species as a result of implementing the recommended removal action.

9.3.2 Non-critical NEPA Elements

Adaptive Management

Adaptive management is incorporated throughout the CERCLA process of site identification, remedial and feasibility study activities, risk assessment, and development of removal action alternatives. Adaptive management will continue to be used as a tool throughout the monitoring period for the on-site repository described in Section 7.4.2.

Socio-economics

No homes or businesses occur within less than a mile of the shale pile. No current economic activities will be limited or impacted by the action. Some small number of short-term employment opportunities may arise if local contractors are used to implement the removal action. Minimal, if any, impacts to the local socio-economic environment are expected from implementation of the recommended removal action.

Vegetation

The highly modified condition of vegetation near the shale pile and Plant Site precludes the possibility of disturbance to any meaningful areas of native vegetation by removal

action activities. Siting criteria for the repository will include specific identification and avoidance of higher quality vegetation.

The major potential impact to sensitive plant species from the repository would be from windblown dust generated during construction activities. This would be temporary, and dust control measures will be employed. Regarding potential uptake by plants on the repository itself, a 3-foot-thick cap is proposed for the repository. The cap will be revegetated. Given the arid climate, the vast majority of moisture consumed by plants will be from the upper three feet of their root system. Hence, even if their roots penetrate the shale material, very little contamination is likely to be absorbed by the plants.

Aquatic Wildlife

Due to the physical and ecological constraints within the West Sharrard Creek, little, if any aquatic wildlife occurs in the vicinity of the shale pile. Site selection and application of appropriate BMPs will severely limit potential negative impacts to aquatic wildlife in the vicinity of the repository site. Minimal, if any, negative environmental impacts are expected to aquatic wildlife from implementation of the recommended removal action. Some positive impacts to these resources farther downstream from the existing shale pile are expected as remediation activities result in greatly reduced contaminant entrance into West Sharrard Creek and the Colorado River.

Terrestrial Wildlife

Little resident wildlife occurs within the vicinity of the shale pile due to limited habitat. However, large game may move through the area, especially during the winter months. Timing limitations on disturbing activities for Big Game Winter Range will be observed during implementation of remedial activities. Minimal, if any, negative environmental impacts are expected to terrestrial wildlife from implementation of the recommended removal action. Some positive impacts from expanded areas of appropriate habitat for wildlife may be expected following remediation and reclamation activities at the shale pile site.

Cumulative Impacts

Extensive historical and on-going human-activities in the general APF area have resulted in relatively large areas of physical disturbance, habitat fragmentation by roads, increased frequency of non-native and noxious plant species, displacement of native vegetation, and reduced areas of wildlife habitat. In the context of this relatively large area and the long-term nature of these environment modifications, potential impacts due to the recommended actions become relatively more insignificant than when estimated in isolation. This is especially true when the relatively short-term nature of most of the impacts is considered.

Fire Management

Neither the presence of the reclaimed waste shale pile site, nor the site of the repository, is expected to impact in any way the designation of this area as Fire Management Zone B under the FSEIS as well as under the Preferred Alternative in the DRAFT RMPA/EIS.

Geology and Fluid Minerals

There are currently two well pads in the Plant Site, adjacent to the proposed repository location. Given the current permitted 40-acre spacing, no significant impacts to existing or potential fluid mineral leases are expected due to implementation of the recommended removal action.

Hydrology/Water Rights

No significant impacts to site hydrology or to existing or potential water rights are expected due to implementation of the recommended removal action.